

## PATENT SPECIFICATION



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437,139

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## PROVISIONAL SPECIFICATION

## Improvements in or connected with Desiccating Apparatus for Instruments or Parts of Instruments

We, BARR AND STROUD, LIMITED, a British Company, of Caxton Street, Anniesland, Glasgow, W.3, and JAMES WEIR FRENCH, a British Subject, of the said Company's address, do hereby declare the nature of this invention to be as follows:—

It is a common experience with instruments provided with casings, particularly optical instruments, that parts housed within such casings may be affected by the conditions of moisture and heat, for example, as prevailing in the tropics. For instance, in optical instruments glass surfaces may be obscured by films of moisture, and silvered surfaces may become tarnished. In electrical instruments the insulation may be affected. In mechanical instruments corrosion may occur.

The hermetic sealing of casings for parts of instruments after initial desiccation, generally is only practicable when no part within the casing is movable by operation from the outside, say with an optical instrument for adjustment of focus or refraction, but in any case it is difficult to maintain effective hermetic sealing over a period of years. Recently, for desiccation purposes, it has been the custom to provide within such casings, hygroscopic salts such as calcium chloride, which in the process of hydration become progressively moist and may ultimately become completely liquid. More recently, for this purpose, substances such as silica gel have been employed, which never become moist and from which the contained moisture can only be driven off by the application of heat to a degree which is never reached in an instrument under ordinary circumstances; it being stated that silica gel contains a multitude of microscopic pores which by capillary action are able to absorb a comparatively large proportion of moisture from the atmosphere.

Silica gel as used usually contains a moisture-content indicator, say an iodine or other salt that changes colour in combining with water, and a visual indication is thereby afforded of the state of saturation of the silica gel, which can

be replaced before it is completely saturated.

Substances of the silica gel type have the disadvantage that, being extremely hard, dust formed through attrition may damage or obscure the parts which the casing is intended to protect; and substances of the calcium chloride type may have the disadvantage that the resultant liquid may cause damage.

This invention is in connection with desiccating apparatus for instruments or parts of instruments, and relates to means devised to prevent the escape of objectionable dust or of liquid from the desiccating substances into the casing, without retarding to an important extent, absorption of moisture by the desiccating substance, to improvements in the method of holding the desiccating substance within a casing, and to holders for the desiccating substance for application to such casings.

According to this invention, there is interposed between the desiccating substance and the interior of the casing a wall composed of moisture absorbing and conducting material in contact on the one side with the air within the casing to be desiccated and on the other side with the desiccating substance, such as silica gel or calcium chloride, together with, when desired, in the case of desiccating substances that become moist, water absorbing material, such as hygroscopic paper or felt, admixed or in direct association with the desiccating substance and means such as wire gauze for the protection of the wall, and means for permitting observation of the contained desiccating substance, and for its ready renewal when required.

In accordance with this invention, a part of the interior of the casing itself may be utilized in providing the holder and in that case the holder may be entirely housed in when the casing is closed, a window generally being provided in the casing and the holder to permit observation of the desiccating substance; or a holder may be provided complete for application to a casing, and, if required, be readily removable. For

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example, the holder may be insertible through an opening in the casing and there fastened in position, and the opening being closed by the insertion of the holder, say by its being screwed into the opening, and the exposed part of the holder generally would have a window.

Some examples according to this invention as applied to a casing of one part of a prismatic binocular will now be described with reference to the accompanying drawing, in which:—

Figure 1 is a longitudinal section and Figure 2 is a transverse section showing the objective end of the casing and a first example.

Figure 3 is a longitudinal section showing the objective end of the casing and a second example.

Figure 4 is a longitudinal section showing a third example.

Figure 5 is a longitudinal section showing a fourth example.

Figure 6 is a longitudinal view, partly in section showing a fifth example.

Figures 1 and 2 show a casing A to which an end plate 2 is secured in any usual manner, say by screws 3, an objective at 4 carried by the end plate 2 and a portion of one of the prisms 5. Within the casing A there is a holder B for the desiccating substance, say silica gel. The holder B comprises a plate 6 of transparent material, say celluloid with a suitably shaped wall 7 of moisture absorbing and conducting material such as chemical filter paper or blotting paper, as free as possible from loose fibres. Within the space between the transparent plate 6 and the wall 7, is silica gel which may be viewed through a window 9. Around the objective holder and at other places where necessary, the two parts 6 and 7 are clamped in direct contact by a ring 10. The action is as follows:—The wall 7 of the holder B abstracts moisture from the atmosphere within the casing A, and this moisture is absorbed by the silica gel 8 which is in direct contact with the wall 7. Change of colour of the silica gel may be observed through the window 9, and when necessary by removing the end plate 2 the holder B can be withdrawn for revival or substitution. In many cases this will be unnecessary over a period of several years as many prismatic binoculars, although not absolutely hermetically sealed, are approximately so. The wall 7 may be protected, say by a sheet of wire gauze or other perforated material. The wire gauze may be on the outside of the wall 7, or if it is within the holder it should be of sufficiently open mesh to

permit of free and direct contact of the silica gel with the wall 7.

For more frequent renewal the arrangement shown in Figure 3 is suitable. In Figure 3, A as before is the casing, 2 is the end plate, 4 the objective, and 5 a portion of one of the prisms. Into the end plate 2 there is inserted a screwed holder B having a window 12 which is retained by a plate 13. The inner end of the holder is closed by a wall 14 composed of moisture absorbing and conducting material, forming part of a cylindrical capsule, the sides of which are pressed into the cylindrical body of the holder. When necessary a protecting gauze 15 secured to a ring 16 may be provided and arranged to hold the capsule in position. The silica gel 8 is contained within the capsule and change of colour is observable through the window 12. The holder B can be unscrewed and a new capsule be inserted with fresh or revived silica gel. As in Figures 1 and 2, the moisture in contact with the absorbent wall 14 is absorbed and in turn transferred to the silica gel 8. Other forms of containers may be used to suit particular conditions. For example, if space lengthwise is available the capsule may be of elongated tubular form, say as indicated in Figure 4, protected by means of a metal gauze casing 17.

When the desiccating substance is of a type such as calcium chloride which becomes increasingly wet as moisture is absorbed, substances may be provided whereby the surplus water may be partially absorbed thus prolonging the useful life of the desiccator. Any kind of surplus water-absorbing substance could be used, such as filter paper, blotting paper, felt, pumice stone, sponge or other material having large pores and water absorbing properties. Pieces of such absorbent material are indicated at 18 in Figure 4.

Figure 5 shows a holder similar to Figure 3 provided with a ring 19 of surplus water-absorbing material; and Figure 6 shows a holder similar to Figure 4, provided with diaphragms 20 of surplus water-absorbing material, which diaphragms may be pierced with holes, if necessary. The windows indicated need only be provided when desired.

Dated this 6th day of August, 1934.

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## COMPLETE SPECIFICATION

Improvements in or connected with Desiccating Apparatus for  
Instruments or Parts of Instruments

We, BARR AND STROUD, LIMITED, a British Company, of Caxton Street, Anniesland, Glasgow, W.3, and JAMES WEIR FRENCH, a British Subject, of the said Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is a common experience with instruments provided with casings, particularly optical instruments, that parts housed within such casings may be affected by the conditions of moisture and heat, for example, as prevailing in the tropics. For instance in optical instruments glass surfaces may be obscured by films of moisture, and silvered surfaces may become tarnished.

The hermetic sealing of casings for parts of instruments, after initial desiccation, generally is only practicable when no part within the casing is operated from the outside, but in any case it is difficult to maintain effective hermetic sealing over a period of years. For desiccation purposes, hygroscopic salts, such as calcium chloride, have been provided within such casings, which in the process of hydration become progressively moist and may ultimately become completely liquid. Also, for this purpose, substances, such as silica gel, have been employed which never become moist and from which the contained moisture can only be driven off by the application of heat to a degree which is never reached in an instrument under ordinary circumstances; it being understood that silica gel contains a multitude of microscopic pores which by capillary action are able to absorb a comparatively large proportion of moisture from the atmosphere.

Silica gel as used for this purpose generally contains a moisture-content indicator that changes colour in combining with water, say an iodine or other salt, and a visual indication is thereby afforded of the state of saturation of the silica gel, which can be replaced before it is completely saturated.

Substances of the silica gel type have the disadvantage that, being extremely hard, dust formed through attrition may damage or obscure the parts which the casing is intended to protect; and substances of the calcium chloride type have the disadvantage that the resultant liquid may cause damage.

This invention refers to the desiccation of optical instruments and to desiccating apparatus for optical instruments, and objects of the invention are:— to provide improved holders for desiccating substances for application to the casings of such instruments so devised as to prevent the escape of objectionable dust or of liquid from the desiccating substances into the casing, without retarding to an important extent absorption of moisture by the desiccating substance; and to effect improvements in the method of holding the desiccating substance within a casing.

According to this invention, optical instruments are provided with desiccating apparatus comprising a holder for desiccating substance, such as silica gel or calcium chloride, which holder is arranged to engage with the casing and thus to be held in position within, or extending into, the interior of the casing, and has interposed between the desiccating substance and the interior of the casing a wall composed of moisture absorbing and conducting material in contact on the one side with the air within the casing to be desiccated and in contact on the other side with the desiccating substance. A material suitable for the wall is unglazed porcelain or earthenware, but chemical filter paper, blotting paper, or the like may be used.

It is known that it has been proposed to provide jars, canisters and like containers with stoppers or covers which act as holders for desiccating substances, the desiccating substance being retained in the stopper or cover by cloth, leather or other permeable or porous material.

In the case of desiccating substances that become moist being used, absorbent material may, in accordance with this invention, be provided within the holder, admixed or in direct association with the desiccating substance, for absorbing surplus moisture, such materials being, for example, hygroscopic paper or felt. Means such as wire gauze may be provided for the protection of the moisture absorbing and conducting wall, and further, provision may be made for enabling the desiccating substance to be observed when in use, and for its ready renewal when required.

In accordance with this invention, part of the interior of the casing itself may be utilised to form a holder and in that case with the casing closed the holder may be

entirely housed-in, a window generally being provided to permit observation of the desiccating substance; or a holder may be provided complete for application to a casing, and, if required, be readily removable. For example, the holder may be insertible through an opening in the casing and there fastened in position, the opening being closed by the insertion of the holder, say by its being screwed into the opening, and the exposed part of the holder generally would have a window.

Some examples according to this invention as applied to a casing of one part of a prismatic binocular will now be described with reference to the drawing left with the provisional specification, in which:—

Figure 1 is a longitudinal section and Figure 2 is a transverse section showing the objective end of the casing of one limb of the binocular with a first example of desiccating apparatus.

Figure 3 is a longitudinal section showing the objective end of the casing and a second example.

Figure 4 is a longitudinal section showing a third example.

Figure 5 is a longitudinal section showing a fourth example.

Figure 6 is a longitudinal view, partly in section showing a fifth example.

Figures 1, 2 and 3 show tubular casing part A to which an end plate 2 is secured in any usual manner, say by screws 3, see Figure 2, an objective at 4 carried by the end plate 2, and a portion of one of the prisms 5. In Figures 1 and 2 within the casing there is a holder B for the desiccating substance, say silica gel. The holder B comprises a plate 6 of transparent material, say celluloid, with a suitably shaped wall 7 of moisture absorbing and conducting material such as unglazed porcelain or earthenware, or chemical filter paper or blotting paper, as free as possible from loose fibres. Within the space between the transparent plate 6 and the wall 7, is silica gel 8 which may be viewed through a window 9. At their outer edges the parts 6 and 7 are clamped together in direct contact between the tubular casing part A and the end plate 2, and around the objective holder they are clamped in direct contact by a ring 10. The action is as follows:— the wall 7 of the holder B abstracts moisture from the atmosphere within the casing and this moisture is absorbed by the silica gel 8 which is in direct contact with the wall 7. Change of colour of the silica gel may be observed through the window 9, and when necessary by removing the end plate 2 the

substitution. In many cases this will be unnecessary over a period of several years as many prismatic binoculars, although not absolutely hermetically sealed, are nearly so. The wall 7 may be protected, say by a sheet of wire gauze or other perforated material. The wire gauze may be on the outside of the wall 7, or if it is within the holder it should be of sufficiently open mesh to permit of free and direct contact of the silica gel with the wall 7.

For frequent renewal the arrangement shown in Figure 3 is more suitable. Into the end plate 2 there is inserted a screwed holder B having a window 12 which is retained by a ring 13. The inner end of the holder is closed by a wall 14 composed of moisture absorbing and conducting material, forming part of a cylindrical capsule, the sides of which fit into the cylindrical body of the holder B. When necessary a protecting gauze 15 secured by a sleeve 16 may be provided and arranged to hold the capsule in position. The silica gel 8 is contained within the capsule and change of colour is observable through the window 12. The holder B can be unscrewed and a new capsule inserted with fresh or revived silica gel. The moisture in contact with the absorbent wall 14 is absorbed and in turn transferred to the silica gel 8. Other forms of containers may be used to suit particular conditions. For example, if space lengthwise is available the capsule may be of elongated tubular form, say as indicated in Figure 4, protected by means of a metal gauze casing 17.

When the desiccating substance is of a type which becomes increasingly wet as moisture is absorbed, such as calcium chloride, pieces of absorbent material, as indicated at 18 in Figure 4, may be provided for partially absorbing the surplus moisture, thus prolonging the useful life of the desiccator. Any suitable kind of absorbent material could be used, such as filter paper, blotting paper, felt, pumice stone, sponge or other material having large pores and good water absorbing properties.

Figure 5 shows a holder similar to Figure 3 provided with a liner 19 of absorbent material; and Figure 6 shows a holder similar to Figure 4, provided with pieces 20 of absorbent material, which may be pierced with holes, if necessary.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An encased optical instrument characterised by its being provided with desiccating apparatus comprising a holder for desiccating substance, such as silica gel or calcium chloride, which holder is arranged to engage with the casing and thus to be held in position within, or extending into, the interior of the casing and has interposed between the desiccating substance and the interior of the casing a wall composed of moisture absorbing and conducting material in contact on the one side with the air within the casing and in contact on the other side with the desiccating substance. 55
2. An encased optical instrument according to Claim 1, characterised by the moisture absorbing and conducting wall being composed of unglazed porcelain or earthenware, chemical filter paper, blotting paper or the like. 60
3. An encased optical instrument according to Claim 1 or 2, in which the desiccating apparatus has a desiccating substance such as calcium chloride which becomes moist, characterised by water absorbent material being provided within the holder, admixed or in direct association with the desiccating substance, for absorbing surplus moisture. 65
4. An encased optical instrument according to Claim 3, characterised by the absorbent material provided within the holder being hygroscopic paper or felt. 70
5. An encased optical instrument according to any of the preceding Claims, characterised by means such as wire gauze being provided for the protection of the moisture absorbing and conducting wall. 75
6. An encased optical instrument according to any of the preceding Claims, characterised by provision being made for enabling the desiccating substance to be observed when in use. 80
7. An encased optical instrument according to any of the preceding Claims, characterised by part of the instrument casing itself being utilised to form a holder for the desiccating substance. 85
8. An encased optical instrument according to Claim 1, 2, 3, 4, 5 or 6, characterised by a holder for desiccating substance being provided complete for application to the instrument casing. 90
9. An encased optical instrument according to Claim 8, characterised by the holder being insertible through an opening in the casing to be there fastened in position, the opening being closed by the insertion of the holder. 95
10. An encased optical instrument according to Claim 9, characterised by the exposed part of the holder having a window. 100
11. An encased optical instrument provided with desiccating apparatus substantially as described with reference to Figures 1 and 2 of the drawing left with the provisional specification. 105
12. An encased optical instrument provided with desiccating apparatus substantially as described with reference to Figure 3 of the drawing left with the provisional specification. 110
13. An encased optical instrument provided with desiccating apparatus substantially as described with reference to Figure 4 of the drawing left with the provisional specification. 115
14. An encased optical instrument provided with desiccating apparatus substantially as described with reference to Figure 5 of the drawing left with the provisional specification. 120
15. An encased optical instrument provided with desiccating apparatus substantially as described with reference to Figure 6 of the drawing left with the provisional specification. 125
16. An encased optical instrument having desiccating apparatus substantially as described. 130

Dated this 18th day of February, 1935.

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FIG : 1.

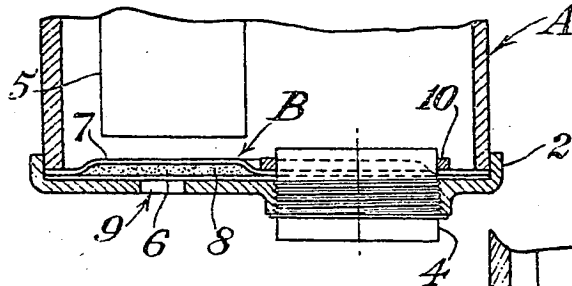


FIG : 3.

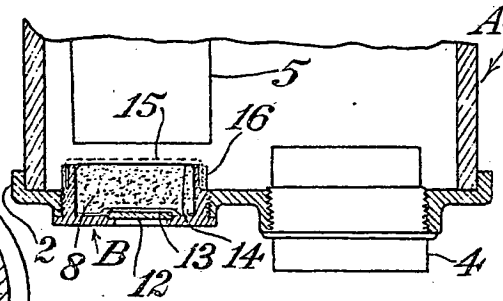


FIG : 2.

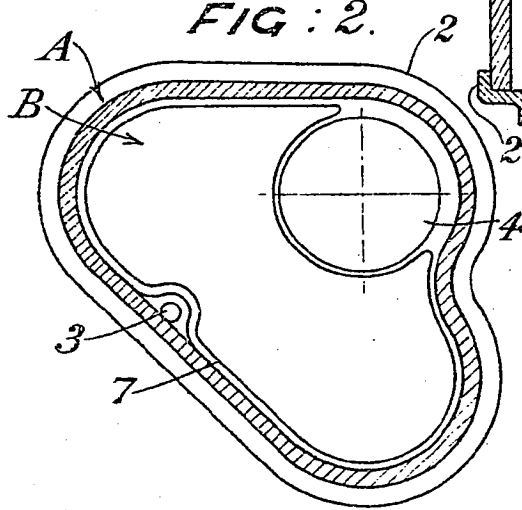


FIG : 4.

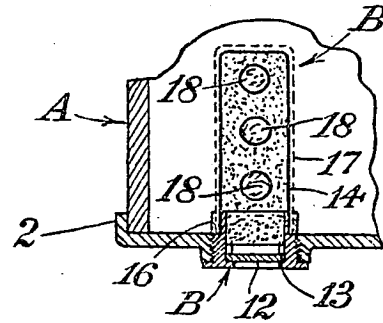


FIG : 6.

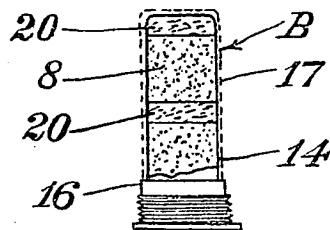


FIG : 5.

